6

Prevention Measures for Deployed Forces

Measures to protect the health of deployed forces take place throughout the life cycle of the service member. Although some of them are continuous activities, for the sake of discussion they can be categorized into measures that take place before, during, and after a deployment (the deployment cycle). Some activities, like risk communication, must take place in different forms throughout the deployment cycle. After a general discussion of risk communication, this chapter considers preventive measures for different stages of the deployment cycle.

RISK COMMUNICATION

Risk communication is a critical process in public health and is a critical process in military health as well. In the civilian community, tremendous interest and effort have led to the development of an understanding of risk perception and risk communication over the last few decades, particularly in the area of risks from environmental hazards and other public health challenges such as smoking and AIDS. The processes of risk perception and risk communication are complex and have generated a substantial and growing body of literature (Slovic, 1987; McCallum et al., 1991; Fischhoff, 1995; Gustafson, 1998).

Risk communication raises a number of interesting and important ethical issues (see, e.g., Cothern, 1996). They are shaped by the following considerations:

1. If a risk is disclosed too early or is based on inadequate evidence, the communicator may be faulted for unnecessarily alarming or even causing panic in potentially affected people, or for underestimating the risk.

2. If a risk is disclosed too late or is based on too high a standard for evidence, the communicator might be faulted for withholding information that would have allowed for informed decisions by (potentially) affected people.

Risk is a probabilistic concept. Some risks are likely to lead to harm, some are unlikely to lead to harm, and some fall between these extremes. Should a very low risk be communicated if the communication itself can have bad consequences? In some cases, risk communication can be riskier than the risk being communicated.

Moreover, the science of risk analysis is imprecise: any particular risk calculation is uncertain and open to revision (Graham and Rhomberg, 1996). Accuracy is achieved not with a precise value that is placed on a particular risk but with a range of values. It is also important to distinguish between the likelihood of a risk being realized, the severity of the risk if it is realized, and the time of onset and duration of the harm if it is realized. Furthermore, those exposed to a risk will vary in the importance that they attach to likelihood, severity, and timing.

What is *risk communication*? The field evolved from the growing need to explain controversial decisions about environmental and occupational hazards, and through social scientists' efforts to understand how people reacted to information about hazards. The decisions often involved technical content and uncertainties difficult to convey in messages for the general public. Initially the term *risk communication* was commonly used to describe one-way messages from experts to nonexperts, but in the last decade there has been a shift of focus from merely the messages themselves to the entire process (National Research Council, 1989). The National Research Council report, *Improving Risk Communication*, described risk communication "as an interactive process of exchange of information and opinion among individuals, groups, and institutions" (p. 21). It construed risk communication to be successful "to the extent that it raises the level of understanding of relevant issues or actions for those involved and satisfies them that they are adequately informed within the limits of available knowledge" (p. 21).

Although in specific situations two-way exchange is vital, it is neither feasible nor appropriate that all communications about risks in the military be dialogues. Different situations warrant different degrees of exchange, falling on a continuum between none and extensive. In many situations a simple one-way brief on the hazards to be faced must be sufficient. In some instances the adequacy of a simple briefing cannot be assumed and feedback is needed to verify that the intended message has been understood. Most challenging perhaps, are those situations that require full discussions that aspire toward meeting the definition of risk communication given above to include active dialogue among all the groups involved. The challenge for the military will be to identify which situations require which levels of interaction between the concerned parties and to plan for these situations. Clearly, a prerequisite for such planning is identification of the various situations in which risk communication does and should occur.

In the statement of task, the study team is charged with addressing "improvements in risk communication with military personnel in order to minimize stress casualties among exposed or potentially exposed personnel" (Appendix B). It is the opinion of the study team that successful risk communication, as defined above, can provide an important contribution not just in minimizing stress casualties but also in improving trust and credibility and in ultimately improving the morale and effectiveness of the fighting force.

Many factors other than the findings of scientific research enter into individuals' perceptions of risk. The extent to which the risk is voluntary or imposed by others, involves a familiar or an unfamiliar risk or is associated with dreaded consequences as well as other factors are all involved in the perceived magnitude and acceptability of a risk. Personal factors are also important: education, cultural background, values, psychological outlook, health, and trust level. Although the provision of a primer on risk communication is beyond the scope of this report, a large body of literature is available (Slovic, 1987; National Research Council, 1989; McCallum et al., 1991; Fischhoff, 1995; Gustafson, 1998). The substance of this literature indicates that when it is carried out well, risk communication can contribute to improvements in mutual respect and trust. It can also help people to make better decisions leading to actions that better reflect objective risks and that consequently reduce morbidity.

A critical site for risk communication in the military is at the level of the service member in his or her unit. Over years of dealing with stress-related casualties during combat, military psychiatry has developed an approach that emphasizes leadership and unit cohesion as critical components in mission accomplishment and prevention of psychological symptoms, physical symptoms, and stress casualties (Stokes, 1998). The nature of the communication between a commander and his or her unit and between members of the unit is clearly both an indicator of and a contributor to the cohesion of the unit.

Another critical juncture for dialogue about risks and health is between health care providers and service members after deployments. The extent to which health care providers listen to their patients' concerns and show understanding and responsiveness while sharing relevant information with them is important. As described for medically unexplained symptoms in Chapter 3, it is helpful for the care provider to acknowledge both the incompleteness of medical and scientific understanding and the areas in which evidence and knowledge are more complete. Because of the complexity of the topic and the possibility of wide variability among providers, specific guidelines are needed concerning what providers say to patients about medically unexplained symptoms, and training is needed to ensure that they follow these guidelines.

In the years since the Gulf War, portions of both the U.S. Department of Defense (DoD) and the U.S. Department of Veterans Affairs (VA) have been forced to consider risk communication issues with more care than in the past. In responding to the concerns of veterans regarding illnesses following their Gulf War deployment, DoD has faced repeated risk communication challenges. The incomplete information and changing messages provided in the summer of 1996

about the destruction of chemical munitions at Khamisiyah, Iraq, in March 1991, were particularly damaging to DoD's credibility. It is universally agreed that losing credibility is much easier than restoring credibility, emphasizing the need for a proactive orientation toward risk communication. In its report on the government's activities in response to Gulf War illnesses, the Presidential Advisory Committee on Gulf War Veterans' Illnesses (1996b) made several recommendations related to the topic of risk communication. Among them was the recommendation that DoD and VA immediately develop and implement a comprehensive risk communication plan "in close cooperation with agencies that have a high degree of public trust and experience with risk communication" (p. 51), such as the Agency for Toxic Substances and Disease Registry and the National Institute for Occupational Safety and Health.

In response, the Clinical Working Group of the Persian Gulf Veterans Coordinating Board developed the Comprehensive Risk Communication Plan. This plan provides many suggestions that can be used by different groups as they undertake risk communication efforts. The guide was included as an appendix in the report, *A National Obligation: Planning for Health Preparedness for and Readjustment of the Military, Veterans, and Their Families after Future Deployments* (National Science and Technology Council, 1998). In the body of the same report, DoD, VA, and the U.S. Department of Health and Human Services (DHHS) endorse the following goal regarding risk communication:

> Goal 5. Establish an effective health risk communication program that educates and informs active military personnel, veterans, and their families throughout the deployment lifecycle and beyond on issues related to health risks and available services. (p. 15)

The study team was encouraged to learn that the goal of an effective health risk communication program was endorsed by the Interagency Working Group from DoD, VA, and DHHS in the National Science and Technology Council document. In the information-gathering workshop of January 1999, the principal investigators and advisors for the present study sought to clarify the extent to which the responsibility of pursuing this goal within DoD had been assigned (Institute of Medicine, 1999a). It appears that although the military services have some limited programs in risk communication, risk communication has not yet been made a priority at the department level.

The Clinical Working Group of the Persian Gulf Veterans Coordinating Board has also recently released a revised version of their risk communication plan. The Comprehensive Risk Communication Plan for Gulf War Veterans "is designed to improve federal efforts to provide a clear and accurate dialog on the health consequences of Gulf War service" (Persian Gulf Veterans Coordinating Board, 1999, p. 3). It provides good advice and sensible suggestions for improving communications with Gulf War veterans. Much of the advice is relevant to communications for deploying forces as well. With a goal of rebuilding and earning veterans' trust in DoD and VA and regaining credibility that has been

lost since the Gulf War, the plan outlines objectives including engaging in ongoing dialogue on health risks, increasing veterans' abilities to cope with symptoms, improving communication, and keeping veterans informed about the health effects of service in the military. The plan notes the critical need for clear goals and evaluation of efforts, and it outlines several research needs for communication with military personnel. The present study team believes all of these points are important for deployed forces generally.

The study team believes that a clear commitment to improvements in risk communication is needed from DoD. Responsibility should be designated to attempt a cultural change within DoD and the military services so that dialogue and exchange about risks are facilitated at all levels. Aspects of risk communication need to be incorporated into the training of line commanders and health care providers. However, the process is an ongoing one that is not conveniently complete with a 1-day or 1-week course. Instead, it requires ongoing reevaluation and effort. The questions whether, when, and how to communicate risk involve a number of nuanced and difficult judgment calls. There is no algorithm for making these calls. It is not sufficient to suggest that a communicator simply "tell the truth" when the truth in a given situation cannot be determined. As well, failing to disclose even very small risks will be regarded by some as a form of deception.

In addition, DoD and the services need to have a discussion about what problems the tool of risk communication may be used to try to solve. Such a discussion can lead to goals for reducing these problems. Evaluation of the extent to which these goals are met can point out both successes and needs for changes.

A recent encouraging example of the use of some of the principles of risk communication within DoD is in the ongoing effort to vaccinate all service members against anthrax. The Anthrax Vaccination Program took proactive steps to inform commanders, service members, their families, and the wider community about the vaccine and the need for it through a variety of messages tailored to target audiences. This effort also illustrates the fact that risk communication is a process that does not end with the first batch of brochures but requires ongoing dialogue in response to the concerns of those involved.

What other risks should be discussed with the service members? It would be impossible as a practical matter to itemize and rank all risks faced by military personnel. There are a number of reasons for this: there are too many, some are minor or trivial, some are or should be assumed (e.g., telling a combat-bound soldier he or she might be wounded by gunfire), and so forth. Since there are almost an infinite number of risks associated with any deployment, these need to be prioritized. However, the priorities suggested by casualty numbers and historical data will not necessarily coincide with the concerns of the service members, who may have other criteria for assigning risk. In general, the risk communication should include battle-related risks, environmental health risks, and psychological hazards. Risk communication should include an introduction to medically unexplained symptoms. To better address the specific concerns of the

troops, information about the nature of these concerns in specific situations is needed, and the collection of this information must be an ongoing process.

An advisory group would fill an important function in this process. The use of a panel to advise communicators has a precedent and analog in the practice of including members of affected groups in biomedical research design and evaluation and on ethics review boards (institutional review boards). This improves acceptance from members of affected groups, as well as providing advice from the perspective of those to whom risk communicators are communicating. Since the task of risk communication is inherently fallible—that is, one can plan on having to manage errors—the existence of such groups can be quite helpful in justifying various risk communication strategies both before and after the fact. Service members from a range of levels and their family members could provide input on their information needs and health concerns. Experts from outside the military could provide ongoing access to the body of knowledge on risk communication developed from civilian experience. Indeed, experts from VA and DHHS were important to developing the Guide to Health Risk Communications found in the National Science and Technology Council (1998) document.

Risk communications do not have to be emotional. Indeed, carefully crafted information about risk is seldom frightening, paralyzing, or counterproductive. Whenever possible, risk communications should be combined with information about how to minimize the risks and deal with the negative outcomes should they occur. They should attempt to increase instead of decrease feelings of control.

In addition to the hazards of deployment that are acknowledged in advance of a particular deployment, health issues that require attention and risk communication are certain to arise during and after deployments. DoD needs to plan for these situations, even though it cannot know in advance what the specific risks or concerns will be. DoD's plan should include plans for the early identification of problems and concerns and the criteria to be used to determine when and how risk communications should take place. An especially important decision is who will serve as the spokesperson during the period when answers to questions raised are unavailable or only provisional.

Data from studies of patients and others encountering difficult or threatening situations suggest that providing a framework or context for interpreting the situation and their likely responses to it can reduce both stress and physical symptoms, even when people cannot change the situation. The study team commissioned Jean Johnson, R.N., Ph.D, to write a paper that addresses the question, "What does the research on informational interventions to reduce the stress of medical procedures tell us about communicating to troops the risks of deployment?" Her review of the evidence suggested that the provision of sensory and procedural information to patients before medical ordeals is often beneficial in reducing outcomes such as pain, emotional distress, poor psychological well-being, medical complications, and length of hospital stay (Johnson, 1998). Preparatory information influences perceptions and interpretations in a manner that enhances peoples' ability to cope with stressful experiences (Johnson, 1998). Suls and Wan (1989) concluded from their review of the research that

descriptions of peoples' typical experiences were most effective for facilitating coping. Studies with other populations also support the concept that preparatory information can help reduce stressful reactions (Inzana et al., 1996). This body of research suggests that alerting troops to the stresses and emotions that they are likely to feel during combat may improve their ability to cope and decrease the negative consequences that sometimes follow from these stressful situations.

Risk communication is not a panacea, and many may have unrealistic expectations about what it can accomplish. To quote the 1989 National Research Council report on risk communication:

> it is mistaken to expect improved risk communication to always reduce conflict and smooth risk management. Risk management decisions that benefit some citizens can harm others. In addition, people do not all share common interests and values, so better understanding may not lead to consensus about controversial issues or to uniform personal behavior. But even though good risk communication cannot always be expected to improve a situation, poor risk communication will nearly always make it worse. (p. 3)

The reasoned creation of policies that acknowledge that risk communication is probabilistic, uncertain, and (sometimes) error prone can serve to reduce error and ethically optimize the practice of risk communication.

Further discussions about risk communications specific to the periods before, during, and after deployment follow. Findings and recommendations about risk communication are provided at the end of the chapter.

PREVENTIVE MEASURES BEFORE DEPLOYMENT

Preventive measures that take place before a deployment include those that occur upon entrance into the service, during training and routine garrison life, and immediately before a deployment.

Preventive Measures on Entrance into the Service

Risk Communication

The first opportunity for risk communication between DoD, the services, and service members occurs as service members are recruited and begin their military service. During this time there may be a tendency to downplay the risks inherent in military service, but the risks of death or injury should be raised and discussed frankly.

Accession Standards

DoD has developed accession medical standards with the purpose of bringing in recruits who are healthy and who can be deployed worldwide. The standards are uniform across the services and are described in DoD Directive 6130.3 (U.S. Department of Defense, 1994a). According to the directive, new applicants must join the services (1) free of contagious diseases that will endanger the health of other personnel, (2) free of medical conditions or physical defects that cause excessive loss of time from military duty for necessary treatment or hospitalizations or would likely result in separation from the military for medical unfitness, (3) medically capable of satisfactorily completing required training, (4) medically adaptable to the military environment without the necessity of geographical area limitations, and (5) medically capable of performing duties without aggravation of existing physical defects or medical conditions (U.S. Department of Defense, 1994a).

Roughly 355,000 physical examinations are conducted on potential new recruits each year, with about 250,000 new recruits entering the services annually. Approximately 15 percent of new applicants are turned away for disqualifying medical conditions. Waivers of the standards for certain medical conditions can be granted with approval of the service's Surgeon General (Ostroski, 1999).

Accession medical standards have improved and have become more stringent with improvements in medicine and technology. The Accession Medical Standards Working Group and Accession Medical Standards Committee were begun in 1995 to bring some systematic tracking and evaluation to the standards. The Steering Committee is co-chaired by the Deputy Assistant Secretary of Defense (Military Personnel Policy) and the Deputy Assistant Secretary of Defense (Clinical and Program Review), with members including representatives from the Office of the Assistant Secretary of Defense (Force Management Policy), Office of the Assistant Secretary of Defense (Health Affairs), Office of the Assistant Secretary of Defense (Reserve Affairs), Offices of the Service Surgeons General, Offices of the Service Deputy Chiefs of Staff for Personnel and Chief of Personnel and Training, and Headquarters U.S. Coast Guard. The working group consists of action officers from these offices (Clark et al., 1999). They review and revise the physical standards for enlistment, induction, and appointment described in the directive. The committee's main objectives are to make sure that military personnel are fit both medically and physically, to make sure that existing medical problems are not compromised further because of training and deployment, and to ensure a cost-effective, healthy force (Ostroski, 1999).

An important change in the system took place in 1998, when the Accession Medical Standards Directive was revised to use the 9th revision of the International Classification of Diseases to track disqualifying, waived, or medically discharged conditions. This system will provide a means of assessing the effectiveness of the standards and the medical experiences of people granted waivers for otherwise disqualifying medical conditions through research carried out by

the Accession Medical Standards Analysis and Research Activity group at the Walter Reed Army Institute of Research (WRAIR).

Some of the medical issues that have been the focus of new approaches or reevaluation of the standards for new applicants are asthma, attention deficit hyperactivity syndrome, refractive eye surgery, knee surgery, and hepatitis B and C. The Surgeons General waive disqualification for certain conditions such as asthma and attention deficit hyperactivity syndrome on a case-by-case basis (Clark et al., 1999; Ostroski, 1999).

Although the accession medical standards are uniform across the services, they are not necessarily implemented identically across them. For example, in the area of psychiatric disorders, potential recruits are not necessarily screened for many of the disqualifying conditions. The Navy and Air Force use certain screens for psychiatric and psychological conditions that the Army does not use (Institute of Medicine, 1999a).

Retention Standards

Reports following the Gulf War suggested that some service members who were deployed to it were not medically fit to carry out their missions (Presidential Advisory Committee on Gulf War Veterans' Illnesses, 1996a). In response to its charge to review compliance with active duty retention standards, the study team was provided a workshop briefing on the topic. Although DoD provides general guidance on separation or retirement for physical disability (U.S. Department of Defense, 1996d), each service has its own medical fitness standards. It is DoD policy that "the sole standard to be used in making determinations of unfitness due to physical disability shall be unfitness to perform the duties of the member's office, grade, rank or rating because of disease or injury" (U.S. Department of Defense, 1996d, p. 2). Because the different services have different missions and working environments, implementation of these guidelines is not uniform across the services. The retention standards are a list of medical disabilities, described in Instruction 1332.38 (U.S. Department of Defense, 1996e). If an individual is identified as having one of these medical disabilities, he or she must undergo a review to determine whether the extent of the disability makes the person unable to perform his or her duties.

The review involves the work of two boards. The Medical Evaluation Board review consists of an evaluation by the individual's attending physician, perhaps a specialist, who writes a narrative summary of the service member's medical condition. This narrative is combined with statements from the member's commander as well as efficiency reports and medical records. The evaluation is then reviewed and signed by three physicians, at least one of whom is at least the second in command of a medical center or a hospital.

The second of the two review boards is the Physical Examination Board. This review board is primarily made up of nonmedical officers who have responsibility for evaluating whether the service member can perform the day-to-

day duties of his or her particular military occupational specialty despite the medical condition. The Physical Examination Board then makes a determination of either fitness to remain in the service or the need for separation from the military (Wortzel, 1999). Retention standards are periodically reviewed by the services' medical specialty consultants for necessary updates.

With limited information gathering on this topic, the study team did not note any problems with the retention standards themselves the challenge for the services is to implement them effectively. Similar to trends in civilian health care, the services are shifting their emphasis away from physical examinations toward a prevention-based approach to care. Physical examinations are generally required every 5 years except for pilots, who receive them more frequently. As described in Chapter 8, meeting the requirement for periodic physical examinations is difficult in some of the reserve components. Furthermore, physical exams do not tend to be the way most health problems in service members are identified; they are found instead when the service member reports it or reports to sick call (Wortzel, 1999). In contrast to the physical exams, the Health Evaluation and Assessment Review (HEAR) will be administered annually, and should thus provide a more current means of assessing service member health status. For this reason it is particularly important that the HEAR also be provided to reserve members, as recommended in Chapter 4.

Recruit Assessment Plan

As described in Chapter 4, the military plans to administer a survey to new recruits upon reporting for basic training to collect baseline health information. The information should be helpful for the implementation of preventive measures for the individual, and over time, as the database provides information on risk factors in the military population, it should be useful for prevention on a population basis.

Preventive Measures During Training and Routine Garrison Life

Doctrine

Doctrine for medical aspects of nuclear, biological, and chemical (NBC) defense is developed by the Army Medical Department Center and School in conjunction with the other services, and exists in several forms. Joint Publication 4-02, *Doctrine for Health Service Support in Joint Operations* (Joint Chiefs of Staff, 1995), is being revised. It will describe the requirements for health service support in an NBC environment. Additionally, there is the *Handbook on the Medical Aspects of NBC Defensive Operations* of the North Atlantic Treaty Organization (NATO) (U.S. Department of the Army, 1996) and Army document FM-8-285, *The Treatment of Chemical Casualties and Conventional Military*

Chemical Injuries (U.S. Department of Defense, 1995). The Army also provides document FM-8-10-7, *Health Service Support in a Nuclear, Biological, and Chemical Environment* (U.S. Department of the Army, 1993), which provides operational doctrine for combat health support in an NBC environment. This document is also under revision. Additional resources are under development on low-level radiation exposure, treatment of biological warfare agent casualties, and protection from potential long-term effects of exposures to an NBC-environment (Flowers, 1998). Doctrine will also be developed on the use of the FOX chemical reconnaissance vehicle, which is used in Bosnia to identify toxic industrial chemicals.

Doctrine on personal protective measures for insects exists in the form of DoD Instruction 4150.7, *DoD Pest Management Program* (U.S. Department of Defense, 1996a). Additional information more relevant to individual protection measures is available in Armed Forces Pest Management Board Technical Information Memorandum No. 36, "Personal Protective Techniques Against Insects and Other Arthropods of Military Significance" (Armed Forces Pest Management Board, 1996). This document notes the critical importance of command emphasis on ensuring compliance with personal protective strategies.

Army Regulation 40-5 provides "a comprehensive disease prevention and environmental enhancement plan of action for the U.S. Army at fixed installations and in support of field forces" (U.S. Department of the Army, 1990, section 1.1). The regulation describes a program that ranges from field sanitation procedures to environmental laboratory services to the epidemiology consultant service. Additional detail or focus is provided in various field manuals.

Training

Given the array of health threats during deployments (reviewed in Chapter 2), it is important that service members learn about typical health risks during deployments and the appropriate countermeasures during their training. Early attention to such issues conveys the message that they are taken seriously by the services, and is likely to increase the level of adherence to further risk reduction instructions offered during deployments

Medical training on treatment is introduced in basic courses when care providers enter the services, and additional training is provided over time. For treatment of chemical and biological agent casualties, training is provided by the Army. In the recent past, satellite broadcasts have been used to train both military and civilian care providers in recognizing and treating infectious diseases or chemical injuries as a result of biological or chemical warfare or terrorism. Courses for professional care providers are also offered periodically at the U.S. Army Medical Research Institute of Infectious Diseases and the U.S. Army Medical Research Institute of Chemical Defense.

It is a different matter for the line commanders, however. Because they are ultimately responsible for the well-being of the troops, their understanding of the

importance and some of the fundamentals of preventive medicine concepts is important. However, they receive very little training in preventive medicine during their basic and advanced courses (Parker, 1999).

It is important that basic preventive medicine measures be emphasized during the training of service members and particularly the training of commanders. Simple measures such as personal protective measures (PPMs) for arthropod bites can be crucial to the health of the forces. There is evidence that even though a highly effective system of PPMs has been available since 1991 (Armed Forces Pest Management Board, 1996), many soldiers are not aware of them (Gambel et al., 1998). Recent deployments have been affected by disease as a result of lack of awareness and lack of enforcement of existing preventive medicine doctrine by commanders in the field (Calow, 1999; Gambel et al., 1999).

Similarly, basic field sanitation may not be receiving the needed command emphasis. Alhough a system of field sanitation exists in Army regulations, the Field Sanitation Teams of deployed units frequently are not properly trained or equipped for their roles (Gambel, 1999).

Vaccines

Policy

Vaccines make up a critical component of the existing countermeasures against infectious diseases and other biological hazards, so service members receive many vaccines as routine aspects of their service. These immunizations protect them from (1) the everyday hazards of garrison life (e.g. cramped quarters with people from throughout the country), (2) infectious diseases endemic to the places to which they deploy, and (3) biological weapons that are determined to be threats in particular areas of deployment. Table 6-1 lists the vaccinations prescribed for military personnel as of 1995 (does not include anthrax). Differences in practices among the services are the result of different training cycles, different missions, and different exposures.

For immunizations not unique to the military, it is DoD policy to follow the U.S. Public Health Service general recommendations, which are developed by the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices and published in the CDC's *Morbidity and Mortality Weekly Report*. For immunizations unique to the military, the departments develop appropriate procedures in consultation with the Armed Forces Epidemiological Board, the Armed Forces Medical Intelligence Center, and the Armed Forces Pest Management Board, as needed (U.S. Department of Defense, 1986).

Principles, procedures, policies, and responsibilities for the immunizations program are detailed in a publication entitled *Immunizations and Chemoprophylaxis* which is issued jointly by the Army, Navy, Air Force, and Coast Guard (U.S. Department of the Air Force, 1995).

TABLE 6-1. Vaccinations Prescribed for Military Personnel

Disease or Agent	Army	Navy	Air Force	Marine Corps	Coast Guard
Adenovirus types 4 and 7	B	B	G	B	G
Vibrio cholerae	E	E	E	E	E
Hepatitis A	G	G	C,D	G	G
Hepatitis B	F,G	F,G	F,G	F,G	F,G
Influenza	A,B,X	A,B,R	A,B,R	A,B,R	B,C,G
Japanese Encephalitis	D	D	D	D	G
Measles	B,F	B,F	B,F	B,F	B,G
Meningococcus (types A, C, Y, W135)	B,D	B,D	B,D	B,D	B,G
Mumps	F,G	B,F,G	F,G	B,F,G	G
Polio	B,D,R	B,R	B,R	B,R	A
Plague	D,F	F	F	F	F
Rabies	F	F	F	F	G
Rubella	B,F	B,F	B,F	B,F	B
Tetanus-diphtheria	A,B,R	A,B,R	A,B,R	A,B,R	A,B
Typhoid	C,D	C,D	C,D	C,D	D
Varicella	F,G	F,G	F,G	G	F,G
Yellow fever	C,D	A,R	C,D	A,R	B,C,E

NOTE: A = All active-duty personnel; B = recruits; C = alert forces; D = when deploying or traveling to high-risk areas; E = only when required by host country for entry; F = high risk occupational groups; G = as directed by applicable surgeon general or Commandant, Coast Guard; R = reserve components; X = reserve component personnel on active duty for 30 days or more during the influenza season.

SOURCE: U.S. Department of the Air Force, 1995.

A special policy exists for immunizations against biological warfare threats and is detailed in DoD Directive 6205.3, *Immunizations Program for Biological Warfare Defense* (U.S. Department of Defense, 1993). The Secretary of the Army serves as the DoD executive agent for this activity. The policy states that personnel assigned to high-threat areas or predesignated for immediate contingency deployment (crisis response) or those identified and scheduled for deployment on an imminent or ongoing contingency operation to a high-threat area "should be immunized against validated biological warfare threat agents, for which suitable vaccines are available, in sufficient time to develop immunity before deployment to high-threat areas" (U.S. Department of Defense, 1993, p. 2). The policy further states that DoD shall develop a capability to acquire and stockpile adequate quantities of vaccines to protect service members against all validated biological warfare threats and that the research, development, testing, evaluation, acquisition, and stockpiling efforts for the improvement of existing vaccines and the develop-

ment of new vaccines shall be integrated and prioritized. A description of the availability, safety, and efficacy of vaccines and therapies for chemical and biological agents is available in a recent report from the Institute of Medicine (1999c).

Vaccine Acquisition and Supply

DoD requires several vaccines that have limited or no market outside of the military. Licensed vaccines in this category include adenovirus type 4 and type 7 vaccines, plague vaccine, and anthrax vaccine. Research and development efforts will likely add several vaccines to this list in the future. Because of their limited market, maintaining a reliable manufacturing base for and supply of these vaccines for military use has proven to be very difficult. Large commercial vaccine companies have shown little or no interest in supplying DoD with small amounts of special vaccines if there is no other market. Reliance on smaller companies with less manufacturing capability and expertise has resulted in an unreliable supply of vaccines.

At present DoD has no manufacturer for the live oral adenovirus type 4 and type 7 vaccines, which are needed to prevent epidemics of acute febrile respiratory disease in recruit training camps (Gray et al., 1999). Previously manufactured vaccines were highly effective (Gaydos and Gaydos, 1995) and very cost-effective, but the sole manufacturer ceased production and neither vaccine is available. Efforts to find a new manufacturer, create and validate the manufacturing capacity, and obtain licensure for new products are under way but may take 2 to 3 years. Meanwhile, acute respiratory disease due to adenoviruses goes unchecked in Army and Navy recruit training facilities (Gaydos and Gaydos, 1995; Gray et al., 1999). Recently, two recruit centers where the vaccines were not available had large acute respiratory disease epidemics (Gray et al., 1999).

The vaccine against plague (which is caused by *Yersinia pestis*) proved to be very effective (Cavanaugh et al., 1974) at protecting troops in Vietnam, where plague is endemic. Previous manufacturers have ceased production of the vaccine against plague and have relinquished the license, leaving DoD without a supply of this vaccine for the foreseeable future.

The manufacturer of the current anthrax vaccine, BioPort, has had problems meeting regulatory requirements and standards, resulting in a costly program to upgrade the manufacturing process and facility so that it meets U.S. Food and Drug Administration (FDA) standards. Since this vaccine is made by a process devised more than 40 years ago, it is far from the optimal product possible today using modern biotechnology production and purification methods. The current vaccine requires multiple doses and contains many extraneous proteins. A much more efficient vaccine that has a uniform content and that requires fewer doses can be developed. The Committee on R&D Needs for Improving Civilian Medical Response to Chemical and Biological Terrorism Incidents recommended that a second-generation anthrax vaccine be developed for civilian use (Institute of

Medicine, 1999c). Developing a second-generation anthrax vaccine would be an appropriate action for DoD as well.

Responsibility for the vaccine supply is divided among several organizations within DoD and the individual services. Procurement of licensed vaccines is done by the services and by Defense Supply Center Philadelphia. The Assistant Secretary of Defense for Health Affairs has both policy and procurement decision-making roles. Research and development responsibility for vaccines for biological defense resides with the Joint Program Office and is carried out through the Joint Vaccine Acquisition Program (JVAP) by a prime contractor. The U.S. Army Medical Research and Materiel Command has responsibility for developing vaccines against diseases other than those caused by biological weapons. JVAP has not yet developed any vaccines, and no manufacturers have yet been identified to supply the products under development (Institute of Medicine, 1998).

Vaccine procurement has been a challenging problem for DoD for many years, and recent events indicate that optimal solutions have not yet been found. A proposal to build a government facility to manufacture vaccines was rejected in 1991 because it was considered too expensive. Current efforts on vaccines against adenovirus, *Y. pestis*, vaccinia virus, and several other agents have a high risk of failure on the basis of previous experience. Multiple problems have arisen from isolated attempts to procure vaccines of no commercial interest from small manufacturers. The current fragmentation of responsibility for vaccine acquisition within DoD may contribute to the problem by failing to consolidate the medical, technical, and program management expertise needed to address these complex problems under a single authority. The Institute of Medicine report *Emerging Infections: Microbial Threats to Health in the United States* (Institute of Medicine, 1992) recommended both an integrated management structure and government production facilities as a means of addressing the growing need for a reliable vaccine supply. Since that time the availability of commercial products has declined and the level and locations of military deployments have increased. The study team urges DoD to reconsider the concept of government production facilities for vaccines.

Identification of Biological Warfare Threats

Annually and as required, the Chairman of the Joint Chiefs of Staff in consultation with the Commanders of the Unified Commands, the Chiefs of the Military Services, and the Director of the Defense Intelligence Agency must validate and prioritize the biological warfare threats to DoD personnel. The Armed Forces Epidemiology Board annually identifies vaccines available to protect against validated biological warfare agents identified as threats and recommends appropriate immunization protocols (U.S. Department of Defense, 1993).

Vaccine Coverage

A survey carried out for the Armed Forces Epidemiological Board in the spring of 1998 found substantial variation in the rates of vaccination against influenza, tetanus-diphtheria, yellow fever, and typhoid among the convenience sample of units included in the survey (Birch and Davis, 1998). Unit coverage rates ranged from 43 percent to 100 percent for single required vaccines, with most units' rates being 90 percent or greater. Units considered likely to be deployed had higher coverage rates than other units, and active-duty units had higher coverage rates than reserve units.

Immunization Record Keeping

The Joint Instruction *Immunization and Chemoprophylaxis* (U.S. Department of the Air Force, 1995) requires a written medical form and PHS-731 card (also known as the "yellow shot card") for each service member. Service policies and practices vary, however, reflecting the status of service record automation, and no one data source yet provides complete data for units or services. In some cases data reside in a number of independent readiness systems used within the services (Birch and Davis, 1998).

The study on immunization coverage by Birch and Davis also found that important data were missing from many records. More than 90 percent of the data sources on typhoid vaccine did not include the name of the vaccine or the route of administration, so it was impossible to determine those who were up to date for the vaccine (Birch and Davis, 1998). Such data are also important, for example, if certain lots were found to be ineffective.

DoD plans to provide immunization tracking through the Preventive Health Care Application, a computerized health information system that is still under development (described further in Chapter 5). In the meantime, the different services are using their own interim systems to collect and report immunization data.

Anthrax Vaccine

As described above, the U.S. military routinely immunizes service members against many infectious disease threats. However, the Secretary of Defense announced plans in December 1997 to ultimately vaccinate all U.S. military personnel against anthrax, a biological warfare agent. Such a mass immunization was unprecedented. The decision reflected the increasing recognition of a valid threat of the use of anthrax as a biological weapon against U.S. forces.

Because of its logistical and public relations ramifications, the decision was a major one. The logistical challenge of immunizing the entire force is tremendous. The current anthrax vaccine, licensed by FDA in 1970, involves a series of six inoculations per service member over an 18-month period (at 0, 2, and 4

weeks and then at 6, 12, and 18 months), followed by an annual booster. Immunization of the estimated 2.4 million service personnel over a 7- to 8-year period requires tremendous planning and ongoing administrative effort.

The public relations challenge is also considerable. The anthrax vaccine is among the many agents to which service members in the Gulf War were exposed and that veterans have considered to be a possible contributor to or cause of illnesses among Gulf War veterans. Although no evidence supports the hypothesis that the anthrax vaccine was a causal factor, concerns continue in the veteran and service member communities and are sustained through the media and the Internet.

The vaccination program is being carried out in three phases that began in May 1998. In Phase I, the forces assigned or rotating to high-threat areas of Southwest Asia and Korea are being immunized. Forces that deploy early into high-threat areas are being immunized in Phase II, and the remainder of the total force and accessions will receive immunizations in Phase III beginning in fiscal year 2003 (Randolph, 1998). After Phase III, the program will be sustained with annual boosters.

The Army is the executive agent for immunizations for Biological Warfare Agents (U.S. Department of Defense, 1993) and for the Anthrax Vaccine Immunization Program (AVIP). As executive agent, the Army monitors the services' implementation of AVIP, oversees the vaccine acquisition and stockpile effort carried out by the Joint Program Office for Biological Defense (JPO-BD), and is the focal point for the submission of information from the services.

Anthrax immunization is a command responsibility that is part of force protection. Commanders are responsible for implementation, education of their personnel, and tracking the anthrax immunization series. The Surgeons General of the services have logistical oversight. JPO-BD centrally funds and maintains the stockpile of vaccines and defined production capabilities (U.S. Department of the Navy, 1998).

Preventive Measures Immediately Before Deployment

Frequently, little time is available between notification that a service member will be deployed and departure, and there are many competing demands for this limited time. Service members have myriad nonmedical activities that need to be done, such as paperwork to update their wills. Medical necessities include acquiring adequate supplies of medications and prescription glasses and last-minute requisite immunizations. The predeployment health questionnaire must also be completed. The service members also have many personal matters to attend to in preparation for departure. Among these competing demands, preventive medicine measures may not always be fully implemented.

The predeployment preventive medicine briefing is an example. Before a deployment, the troops are given briefings about the health threats they will encounter in the theater of operations and the countermeasures that they will need

to use. It is important that these briefings take place. The discussions of potential risks and their countermeasures should emphasize those risks considered of greatest importance on the basis of such criteria as prevalence, potential harm, and preventability and should include discussion of some of the service members' chief concerns.

Starting with Operations Desert Shield and Desert Storm (the Gulf War), an additional tool used to provide information to troops and commanders during a deployment has been available: booklets with environmental and preventive medicine information for different areas of deployment. These are produced by both the Division of Preventive Medicine at WRAIR and the U.S. Army Research Institute of Environmental Medicine (USARIEM) and are intended to be taken along during the deployment. The USARIEM guides are designed for small-unit leaders, whereas the WRAIR booklets are designed for all military personnel, for small-unit leaders, medical planners, and health care providers (Huycke et al., 1997).

Such information booklets provide valuable reinforcement of the information provided to the service member through training and briefings. They cannot be considered replacements for training and briefing, however, because the information is sufficiently important that the service member should receive a briefing. The booklets should be distributed in a timely manner and written at the reading levels of the target audiences. Their effectiveness, however, should be evaluated (Huycke et al., 1997) because there is no evidence that they are read, understood, remembered, or used by service members. Since 1996, the U.S. Army Center for Health Promotion and Preventive Medicine has coordinated the publication of these reports. Additional products have been developed, including decks of playing cards with prevention tips on them, and one-page pamphlets and laminated cards with information on particular hazards, such as ticks and rodents for soldiers deployed to Bosnia.

PREVENTIVE MEASURES DURING DEPLOYMENT

Risk Communication

As exposures or health concerns arise during deployments, commanders at all levels must be prepared to provide service members with the best information available to them. Procedures are needed to ensure that concerns about emerging problems are shared across levels, facilitating their recognition and investigation and aiding in the development of well-considered communications.

Combat Stress Reactions and Control

As noted in Chapter 2, the importance of unit cohesion in affecting the rates of psychiatric breakdown in combat came to be recognized in World War II.

Today, unit morale and leadership are acknowledged across the services to be among the most important factors for preventing combat stress reactions (Manning, 1994; D. R. Jones, 1995; Mateczun, 1995; Rock et al., 1995).

Once an acute stress reaction ("battle fatigue") has occurred, several aspects of response are considered crucial to returning the service member to duty without long-term sequelae. The principles of battle fatigue management, first described by Salmon (1929) in World War I, are proximity, immediacy, and expectancy, as described in Chapter 2. The U.S. Army has used the mnemonic PIES to capture these principles and that of simplicity of treatment, whereas the U.S. Navy and Air Force have taught the same principles with the acronym BICEPS, where B and C are for brevity (treatment will be brief [hours or days]) and centrality (treatment is at a central location and there is no evacuation until the individual has been evaluated by skilled professionals), respectively (Hazen and Llewellyn, 1991; Stokes, 1998). Hazen and Llewellyn (1991) cited sources that assert that with appropriate application of these fundamental principles, a recovery rate of 70 to 90 percent can be expected from prehospital treatment elements (Hazen and Llewellyn, 1991). During the Gulf War, evacuation policies and resources made it difficult to carry out a rapid return to duty in the service member's original unit, despite the potential harm of evacuation (removing needed proximity, immediacy, and expectancy, as described in Chapter 2) to the battle-fatigued soldier (Martin and Cline, 1996).

Although different parts of the military have been using the combat stress control tools described above for years, DoD has recently established a policy on the topic. DoD Directive 6490.5, *Combat Stress Control (CSC) Programs*, requires that each of the services implements plans to "enhance readiness, contribute to combat effectiveness, enhance the physical and mental health of military personnel, and to prevent or minimize adverse effects of Combat Stress Reactions" (U.S. Department of Defense, 1999a, p. 2). The policy also indicates that "leadership aspects of combat stress prevention shall be addressed in senior enlisted, officer and flag-rank training programs. Protective factors against combat stress reactions, such as frequent communication (in person) with troops, unit morale and unit cohesion, shall be emphasized" (p. 2). Furthermore, "CSC units shall train with operations organizations or platforms on a regular basis" (p. 2) and combat stress casualty rates shall be collected as a discrete category from other disease and non-battle injury casualty rates.

The study team applauds this policy and hopes that it will be implemented effectively and with dispatch throughout the services. The study team encourages studies to evaluate the impacts of the new programs where feasible.

Postcombat debriefing has also become a part of the military response to combat trauma. Debriefing entails the involvement of everyone in the group in a verbal reconstruction of the event in precise detail. A group consensus is sought to resolve individual misperceptions and restore perspective about true responsibility. Feelings about the event are discussed and validated as normal, as are some of the stress symptoms that unit members experience (U.S. Department of the Army, 1994).

A debriefing process was incorporated into the Navy's Special Psychiatric Rapid Intervention Teams in 1978, and the Army used debriefing techniques in response to several terrorist attacks in the 1980s (Koshes et al., 1995). Although there was no formal doctrinal mandate or training program for unit debriefings in the Gulf War, U.S. Army mental health teams did conduct them (Koshes et al., 1995; Belenky et al., 1996b). Critical event debriefings after traumatic events became common practice after the deployment of Army division mental health teams and combat stress control detachment teams to Somalia in January 1994 (Koshes et al., 1995). A particular form of debriefing developed by Mitchell (1983), called "critical incident stress debriefing" is designed for traumatic incidents involving preexisting civilian teams. The military uses a modification termed "critical event debriefing" (Koshes et al., 1995). The new DoD policy on Combat Stress Control (CSC) programs includes Critical Event Debriefings (to take place "as indicated") among the responsibilities of the CSC unit personnel after exceptionally stressful events (U.S. Department of Defense, 1999a).

Debriefing has become a part of the response to traumatic events out of the expectation that it can help prevent posttraumatic stress disorder (PTSD). However, a recent systematic review of psychological debriefing for the prevention of PTSD did not indicate that single-session debriefing reduced psychological distress or prevented the onset of PTSD. There was no evidence that debriefing reduced general psychological morbidity, depression, or anxiety (Wessely et al., 1997). Since DoD is drawing upon critical-event debriefings as part of its policy on combat stress control, it should evaluate its impact to the extent feasible. A recent Institute of Medicine report (1999c) noted similar research needs for the civilian community.

Use of Investigational New Drugs by the Armed Forces

Among the several force protection issues highlighted by the experiences of the Gulf War have been the difficulties surrounding the use of drugs or biologics that have not been licensed by the FDA.

FDA grants licensure to drugs or biologics that have been shown to be both safe and efficacious for the use in question. Drugs developed to protect against chemical or biological warfare agents or other dangerous infectious diseases can be demonstrated to be safe in humans with the usual procedures. However, the human efficacy trials usually required by FDA as direct evidence of efficacy are not possible for products that cannot be tested in the field against the natural disease and for which challenge studies are too dangerous. As a result, a large and growing number of much-needed products currently under development in military research and development programs have not proceeded to licensure by FDA.

A product under development is termed "investigational" when it is being tested in volunteer subjects under an Investigational New Drug Application (IND) and has not been licensed by FDA for the intended use. FDA controls the use of an investigational new drug and studies must be conducted under approved protocols.

This ordinarily necessitates review by an institutional review board and obtaining informed consent from the recipient of the product. It also requires the maintenance of detailed records of the drug administration and the results.

In the Gulf War, DoD faced the threat that Iraq might use chemical and biological warfare agents. Two medical products available to potentially protect against these agents were pyridostigmine bromide (PB) and botulinum toxoid (BT) vaccine. PB had been licensed and in use for many years as a treatment for myasthenia gravis, and data from studies with animals supported its effectiveness as a pretreatment against certain nerve agents. BT had been used routinely for more than 25 years as a vaccine for industry and laboratory workers with potential occupational exposure to botulinum toxins. Both were investigational products being administered and tested for military purposes under INDs.

Because DoD was concerned before the Gulf War that it could not follow the rules for administering products under IND status in battlefield circumstances, it requested that FDA waive the informed consent and other IND requirements. After several months of discussion, FDA did so in the form of an Interim Rule establishing the authority of the Commissioner of FDA to waive IND requirements in certain military exigencies (Federal Register, 1990). The Interim Rule had several requirements, including that the FDA decision must be based on a finding that obtaining informed consent is not feasible, that withholding treatment would be contrary to the best interests of military personnel, and that no satisfactory alternative product is available.

The use of PB and BT in the Gulf War was characterized by poor record keeping, inadequate data collection, and other violations of the terms agreed to in the FDA waivers (Rettig, 1999). In the years after the war, progress toward completion of the rule making for the Interim Rule was complicated and slow (Presidential Advisory Committee on Gulf War Veterans' Illnesses, 1996b; Rettig, 1999). In October 1998, the progress was overtaken by events when the U.S. Congress passed legislation providing that only the President can waive the requirement for informed consent when an investigational new drug is administered (P.L. 105-261, Section 731). The legislation requires that for informed consent to be waived it must be determined that it is not feasible, is contrary to the best interests of the member, or is not in the best interests of national security.

The new legal setting will place markedly increased responsibility on both FDA and DoD to work toward ways to provide service members with appropriate medical protection against battlefield hazards. FDA has indicated that it will propose to amend its new drug and biological product regulations

> to identify the kind of evidence needed to demonstrate the efficacy of drug and biological products used to treat or prevent the toxicity of potentially devastating chemical or biological substances when efficacy studies in humans ethically cannot be conducted because they would involve administering a lethal or permanently disabling toxic substance to healthy human volunteers without a proven treatment. (*Federal Register*, 1998, p. 21957)

No amended regulations have been proposed as of this writing.*

The new regulations will make it difficult to obtain an exemption from the informed consent requirement. They will make it possible to advance products to licensure provided that research is done to generate the data needed to meet the new FDA requirement. These events place an increased responsibility on DoD to begin, in communication with FDA, to accelerate the research needed to meet the new criteria. Both agencies must do much work to ensure that necessary research and development efforts proceed rapidly and that appropriate standards for proof of efficacy are established.

PREVENTIVE MEASURES AFTER DEPLOYMENT

Risk Communication

Risk communication after a deployment is a crucial component of the appropriate care and support for the service member upon his or her return. Health concerns and health problems are almost certain given the experiences of previous major deployments, and deployed forces will need information to understand them. As discussed in the *Comprehensive Risk Communication Plan for Gulf War Veterans* (Persian Gulf Veterans Coordinating Board, 1999), risk communication will be successful only to the extent that trust and credibility are present. Thus, efforts at risk communication must be part of an overall effort to see that returning service members are treated with gratitude and provided with medical care and support services to ease their readjustment.

Reintegration

The challenges of a major deployment do not end upon the service member's return. Service members must readjust to home life and perhaps civilian life (for those separating from the service or returning to inactive reserve status). A discussion of the challenges of reintegration and the programs provided for service members is found in Chapter 7.

Medical Management and Symptomatic Treatment of Medically Unexplained Symptoms

Clinicians and other persons working in medical surveillance must recognize that medically unexplained symptoms are just that, namely, they have no

*On October 5, 1999, FDA proposed regulations describing the evidence needed to demonstrate efficacy of new drugs for use against lethal or permanently disabling toxic substances when efficacy studies in humans cannot ethically be conducted.

current explanations. Therefore, conveying the limits of modern medicine coupled with a compassionate approach to patients with medically unexplained symptoms is essential to the management strategy for such patients. Until clear etiological factors are identified, the health care professional relies upon a body of knowledge about the management of medically unexplained symptoms (described below), and this approach has proven to be effective in many cases.

Because medically unexplained symptoms are a prevalent and persistent problem that is associated with high levels of subjective distress and functional impairment and with extensive use of medical care, the study team believes that it is important to institute an aggressive program of early diagnosis and symptomatic treatment. Although a program of primary prevention is not feasible given the current state of knowledge, the study team does believe that enough is known to recommend the implementation of a secondary prevention strategy. This would encompass the early detection of medically unexplained symptoms by primary care physicians and a graduated series of palliative, symptomatic treatment interventions.

There is good clinical evidence that medically unexplained symptoms are much harder to treat and ameliorate once they have become chronic and the individual has accommodated to the sick role and family roles are reconfigured (Kellner, 1986; Kroenke and Mangelsdorff, 1989; Kellner, 1991; Craig et al., 1993; Barsky, 1998). It is therefore important to identify patients with medically unexplained symptoms early, when there is a greater opportunity to restore the patient to his or her previous level of function and avoiding invalidism and assumption of the sick role. Two methods could be used to detect medically unexplained symptoms early. The first method is through the incorporation of a self-report questionnaire into the routine, comprehensive health assessments that all personnel periodically undergo. The HEAR (which is described in Chapter 4) will be administered annually to all active-duty service members, and the RAP (see Chapter 4) is planned to be administered to all personnel at the time of induction. Both assessments should include a self-report screening questionnaire to identify individuals with a high likelihood of having persistent medically unexplained symptoms. Questionnaires (such as the PRIME-MD, the Somatic Symptom Inventory, and the Somatoform Disorders Schedule) already exist to measure this that have adequate reliability and validity (Barsky et al., 1986, 1991; Swartz et al., 1986; Weinstein et al., 1989; Spitzer et al., 1994; Janca et al., 1995; Kroenke et al., 1998b).

The second method of early identification is through a heightened awareness of medically unexplained symptoms on the part of primary care providers. This is necessary throughout the military medical care system and should not be restricted only to the health care of deployed personnel. These providers need to know more about medically unexplained symptoms, to understand the problem in depth, and to acquire the clinical skills and strategies needed for optimal medical management of patients with these symptoms.

Having learned to recognize and identify the problem earlier in its course, the physician must then be able to bring specific knowledge and skills to bear to

help the patient. These include the following: validating the patient's distress and then negotiating a mutually agreed upon set of therapeutic goals; shifting the focus of the medical care interaction from definitive diagnosis and outright cure to coping with residual symptoms and rehabilitation; providing the patient with an explanatory model of symptom amplification to account for the patient's symptoms; cautious and limited reassurance; and a search for a comorbid psychiatric disorder that may be contributing to suffering and functional impairment (Smith et al., 1986b; Barsky, 1997; Barsky and Borus, 1999). Primary care providers will require in-service training and workshops to become more knowledgeable about, comfortable with, and proficient in this clinical approach. The study team believes that a program of continuing education should be undertaken for all military primary care providers to improve their clinical ability to diagnose and treat medically unexplained symptoms. Although this educational effort would be extensive and expensive, the study team believes that it would be cost-effective in light of the high prevalence of medically unexplained symptoms, the high level of disability and functional impairment that it entails, and the enormous medical care costs that ensue when the condition is not optimally treated.

The primary care setting is the best locus for the treatment of medically unexplained symptoms. However, some patients' symptoms will prove to be refractory to the primary care provider's efforts. Such patients should be referred to more intensive, multimodal programs developed on a rehabilitative model. One such program has been established for some of the Gulf War veterans with medically unexplained symptoms (Engel et al., 1998). Modeled after the University of Washington's Multidisciplinary Pain Center (Loeser and Egan, 1989), this is a 3-week, intensive outpatient program with a highly structured physical activation plan and intensive psychosocial elements to address the chronic nature of reduced functioning and the many factors that reinforce it. Specific components of the multimodal approaches have been in use for many years, with the best studied of these involving a combination of cognitive-behavioral therapy (CBT) and physical reactivation. This approach has much in common with cognitive-behaviorally based programs now emerging for the treatment of a variety of functional somatic syndromes, including irritable bowel syndrome, fibromyalgia, chronic fatigue syndrome, headache, and atypical chest pain (Buckelew, 1989; Martin et al., 1989; Salkovskis, 1989; Blanchard et al., 1990; Skinner et al., 1990; DeGuire et al., 1992; Keefe et al., 1992; Sharpe, 1995; Speckens et al., 1995; Van Dulmen et al., 1996; Deale et al., 1997; Mayou et al., 1997; Clark et al., 1998). Controlled intervention trials with long-term follow-up have begun to demonstrate the effectiveness of CBT in reducing somatic symptoms, generalized distress, and disability (Buckelew, 1989; Martin et al., 1989; Peck et al., 1989; Salkovskis, 1989; Blanchard et al., 1990; Hellman et al., 1990; Skinner et al., 1990; DeGuire et al., 1992; Keefe et al., 1992; Sharpe et al., 1992, 1995, 1996; Payne and Blanchard, 1995; Speckens et al., 1995; Van Dulmen et al., 1996; Deale et al., 1997; Fulcher and White, 1997; Clark et al., 1998). These interventions help patients cope with symptoms by reexamining their health

beliefs and expectations and by exploring the impact of the sick role and of stress and distress on their symptoms. Patients are assisted to find alternative explanations for their symptoms, restructure faulty disease beliefs, alter expectations, and learn techniques of focused attention and distraction. The cognitive-behavioral approach stimulates patients to assume a more active role in coping and rehabilitation, and it counters their belief that cure can result only from the application of a technological intervention to a passive patient. Behavioral strategies, such as response prevention, systematic desensitization, graduated exercise regimens, and progressive muscle relaxation, help patients resume normal activities, minimize role impairment, and curtail sick behaviors.

The implementation of these programs of secondary prevention will require careful and rigorous evaluation. The yield of screening questionnaires for detection of the early stages of medically unexplained symptoms (if incorporated into the HEAR or the RAP) must be assessed. Longitudinal studies are necessary to determine how well such instruments perform in terms of specificity, sensitivity, and positive predictive value. The highly specialized, multimodal, intensive treatment programs that the study team recommends need to be subjected to carefully controlled, randomized evaluation. It is difficult to design suitable control groups and to randomize patients in such studies, but these obstacles are not insurmountable. Finally, the effects of educational programs for primary care physicians also need evaluation. It is difficult to demonstrate changes in physician behavior and practice resulting from educational interventions, but medical care outcomes can also be assessed.

In addition to implementing and evaluating a comprehensive program of secondary prevention and treatment, the study team believes that a thorough program of research is also necessary. Current knowledge and understanding of medically unexplained symptoms are inadequate, particularly in light of their high prevalence and costs in personal distress and suffering, functional disability and impaired productivity, and ineffective and inefficient medical care. Prospective studies are necessary to assess the role of predisposing causes (such as a prior history of medically unexplained symptoms, psychiatric disorder, and trauma or abuse), precipitating factors (including deployment and other stressful events), and perpetuating and maintaining factors. Phenomenological and descriptive studies are needed to investigate the complex and poorly delineated relationships between medically unexplained symptoms and PTSD. Epidemiological surveys are needed to document the incidence, prevalence, and course of medically unexplained symptoms and to distinguish and delineate chronic, severe, and disabling medically unexplained symptoms from transient and less severe medically unexplained symptoms. Finally, as mentioned above, careful outcomes studies are needed to assess the outcomes after various treatment interventions.

In February 1999, DoD published a request for proposals on several research topics related to Gulf War illnesses (Commerce Business Daily, 1999). Among them was a solicitation for research on several symptom-based conditions, as well as a solicitation for studies of any of a variety of aspects of deployment health including development of physical symptoms following de-

ployments. The study team encourages DoD to continue to try to involve academic institutions in education and research efforts related to medically unexplained symptoms.

FINDINGS AND RECOMMENDATIONS

Finding 6-1: Although there are encouraging signs that the importance of risk communication has been acknowledged within some quarters of the U.S. Department of Defense, additional indications of commitment to a cultural change throughout the entire system are needed from the top. Effective risk communication cannot be reduced to a list of do's and don't's. Constant reevaluation and change are needed as well as training, with the participation and input of service members from many levels.

Recommendation 6-1: Although responsibility for risk communication must permeate all levels of command, the U.S. Department of Defense (DoD) should designate and provide resources to a group within DoD that is given primary responsibility for developing and implementing a plan to achieve the risk communication goal articulated in the National Science and Technology Council's Presidential Review Directive. Such a plan should

- **Involve service members, their families, and outside experts in developing an explicit set of risk communication topics and goals. In other words, decide what information people need to know and when they need to know it.**
- **Consider how to deliver the information, including the intensity of communication needed for different types of risks. Some topics will necessitate full, ongoing dialogue between the involved parties, whereas others will require less extensive efforts. Incorporate procedures to evaluate the success of risk communication efforts and use these evaluations to revise the communication plan as needed.**
- **Include a response plan to anticipate the inevitable appearance of new risks or health concerns among deployed forces. The plan should include a process for gathering and disseminating information (both about the risks themselves and about the concerns of the troops) and for evaluating how communications about these issues are received and understood by service members and their families.**
- **Educate communicators, including line officers and physicians, in relevant aspects of risk communication.**
- **Carry out the interagency applied research program described in the National Science and Technology Council's Presidential Review Directive (Strategy 5.1.2).**

Finding 6-2: Recent efforts to make accession standards evidence based are laudable. The means appear to be in place to evaluate and improve accessions standards (no recommendation).

Finding 6-3: Each service member should be provided the essential skills, supplies, and equipment to stay healthy while he or she is deployed. Lack of effective preventive medicine training can compromise the health of deployed forces and missions.

Recommendation 6-3: Provide the time for field preventive medicine training for service members including members of the reserves and particularly for line commanders during basic and advanced training.

Finding 6-4: Vaccine procurement has been a challenging problem for the U.S. Department of Defense for many years and recent events indicate that optimal solutions have not yet been found. The IOM report on *Emerging Infections: Microbial Threats to Health in the United States* (Institute of Medicine, 1992) recommended both an integrated management structure and government production facilities as a means of addressing the growing need for a reliable vaccine supply.

Recommendation 6-4: The U.S. Department of Defense should reevaluate the concept of government facilities for vaccine production and stockpiling.

Finding 6-5: Advances in biotechnology make possible the development of a second-generation vaccine that would require fewer doses. An Institute of Medicine committee recently recommended operations research on the development of improved vaccines against anthrax.

Recommendation 6-5: The U.S. Department of Defense should begin development of a second-generation vaccine against anthrax.

Finding 6-6: The small booklets on environmental and preventive medicine information relevant to the area of deployment given to some deploying service members provide useful information, but they are not a substitute for personal protective measures training and there is no evidence that they are read and understood.

Recommendation 6-6: Evaluate the extent to which the preventive measures booklets relevant to the area of deployment are read and understood by service members including members of the reserves.

Finding 6-7: The U.S. Department of Defense's new policy on combat stress control programs should bring some consistency and needed visibility to the prevention and management of combat stress reactions. The emphasis on training for leaders and the collection of surveillance data on combat stress reactions

are important. Since the impacts of some interventions are in question, additional research on them is warranted.

Recommendation 6-7: Seek ways to evaluate scientifically the combat stress interventions that are used.

Finding 6-8: The legislative requirement that the President grant waivers of the requirement of informed consent for products with investigational status is an appropriate policy solution to a difficult and complex issue. It will make such waivers much more difficult to obtain and place added responsibility on the U.S. Department of Defense and the Food and Drug Administration to conduct research and to license the products needed for protection of the health of forces and preservation of national security. Both agencies must recognize and act on this increased responsibility for the health of service members.

Recommendation 6-8: The U.S. Department of Defense in consultation with the Food and Drug Administration should review the status of all products with investigational status and ensure that research and development efforts that will lead to the licensure of essential products are implemented.

Finding 6-9: Medically unexplained physical symptoms have been a prevalent and persistent problem in military populations after major deployments. Information from the civilian literature indicates that early recognition and symptomatic treatment of the problem may help to avoid the development of more serious chronic problems.

Recommendation 6-9: The study team recommends that the U.S. Department of Defense develop an improved strategy for addressing medically unexplained symptoms involving education, detection, mitigation, evaluation, and research.

- **Undertake a program of continuing education for military primary care providers to improve their clinical ability to diagnose, treat, and communicate with patients with medically unexplained symptoms.** Incorporate the topic into the curricula of military graduate medical education programs such as the Uniformed Services University of the Health Sciences and the service schools for medical personnel. To the extent possible, make information about medically unexplained symptoms available and accessible to service members and to civilian health care providers for members of the reserves.
- **Carry out a pilot program to identify service members in the early stages of development of medically unexplained physical symptoms through the use of routinely administered self-report questionnaires and through informed primary care providers.**

- **Evaluate the efficacy of the pilot secondary prevention and treatment program, including the ability of screening questionnaires to detect early stages of medically unexplained symptoms.**
- **Treat medically unexplained symptoms in the primary care setting whenever possible, with referral to more intensive programs as necessary.**
- **Carry out a research program with prospective studies to assess the role of predisposing, precipitating, and perpetuating factors for medically unexplained symptoms. As feasible, involve academic health centers in the research efforts.**